

# Vector Practice – Physics 40

## Simple Vector Conversion

Find the magnitude and direction of the following vectors:

$$12\hat{x} + 3\hat{y}$$

12.37 @ 14.04° N of E

12.37 @ 75.96° E of N

$$-5\hat{x} + 3\hat{y}$$

5.83 @ 30.96° N of W

5.83 @ 59.04° W of N

$$-2\hat{x} + -4\hat{y}$$

4.47 @ 63.43° S of W

4.47 @ 26.57° W of S

$$-6\hat{x} + 7\hat{y}$$

9.06 @ 49.4° N of W

9.06 @ 40.6° W of N

$$4\hat{x} + 4\hat{y}$$

5.66 @ 45° N of E

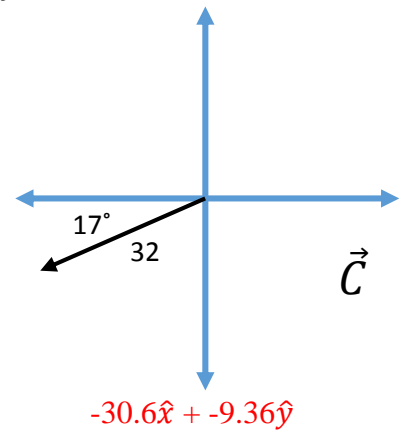
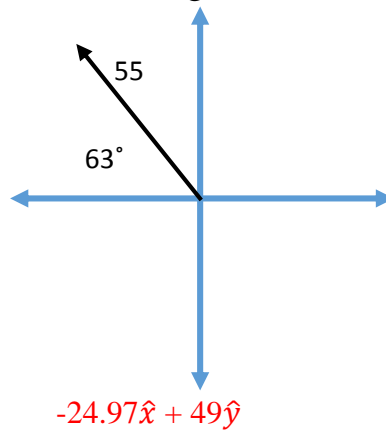
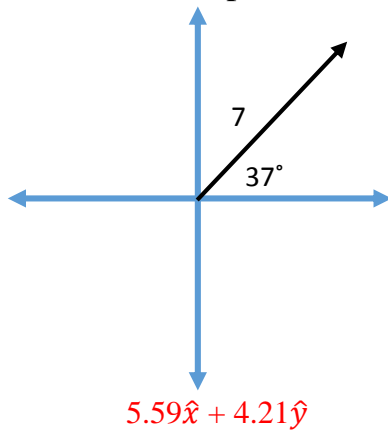
5.66 @ 45° E of N

$$5\hat{x} + -1\hat{y}$$

5.1 @ 11.31° S of E

5.1 @ 78.69° E of S

Find the component form of the following vectors (in  $\hat{x}$  &  $\hat{y}$  form):



$$\vec{A} = 17 @ 35^\circ \text{ N of E}$$

$$13.93\hat{x} + 9.75\hat{y}$$

$$\vec{B} = 5 @ 15^\circ \text{ E of S}$$

$$4.83\hat{x} + -1.29\hat{y}$$

$$\vec{C} = 80 @ 60^\circ \text{ N of W}$$

$$-40\hat{x} + 69.24\hat{y}$$

Using vectors  $\vec{A}$ ,  $\vec{B}$  &  $\vec{C}$  above, solve the following:

$$\vec{A} + \vec{C}$$

$$-26.07\hat{x} + 78.99\hat{y}$$

$$\vec{B} - \vec{C}$$

$$44.83\hat{x} + -70.53\hat{y}$$

$$\vec{A} - (\vec{C} + \vec{B})$$

$$49.1\hat{x} + -58.2$$

## 2D Rate Problems:

- You are rowing a boat eastward across a river at  $4\text{m/s}$ . The current pushed you downstream at a rate of  $1.8\text{m/s}$ . If the river is  $100\text{m}$  wide, how far downstream from where you started do you land?

$45\text{m}$

- A swimmer swims straight across a river with a downwards current of  $0.5\text{m/s}$ . After swimming at  $2\text{m/s}$ , she reaches the other side, and she notices she's drifted downstream  $30\text{m}$ . What is the width of the river?

$120\text{m}$

- A boater is traveling across a  $500\text{m}$  river with a downstream current of  $0.25\text{ m/s}$ . The boat lands  $40\text{m}$  downstream of where it started. How fast was the boat traveling?

$3.125\text{m/s}$

- You drive a boat across a  $70$  river at  $7\text{m/s}$  and find you've traveled  $4$  meters downstream from where you've started when you land. What is the current of the river?

$0.4\text{m/s}$

- A car travels along the highway at  $40\text{m/s}$ . As it travels down a  $120\text{m}$  stretch of road, a gust of wind blows it  $30\text{m}$  across the road perpendicular to the direction of travel. What is the velocity of the wind?

$10\text{m/s}$